by using index guiding as for the buried heterostructure (BH) laser configuration or by forming narrow mesas or inverse mesa geometry structures. Many techniques, such as the use of reverse biased diodes as lateral current blocking layers, or oxide or polymide insulating layers or deeply etched recesses for lateral isolation and lowering of parasitic capacitances, can be used as is within the capabilities of those familiar with the art. Also, as is well within the capabilities of those familiar with the art, by inserting a grating profile layer at the bottom or top interface of the cladding layers 232 or 234, a DFB (distributed feedback) laser or DBR (distributed Bragg reflector laser) can be realized which has a very narrow frequency spectrum suitable for fiber-optic communications. Finally, any of the conventional growth techniques, such as MBE or MOCVD or VPE or LPE, can be used for the growth of the device, and the charged doping for n-type and p-type layers, which is achieved by conventional doping techniques, can be reversed.

IN THE CLAIMS:

Please amend claims 1, 2, 29, 30, 77, 81, 85, 119 and 132 to read as follows:

A1

1. (Amended) A method of modifying a semiconductor compound or alloy comprising host atoms in a host crystal lattice to have a lower effective bandgap than the semiconductor compound or alloy has prior to modification, the method comprising:

isoelectronically co-doping the semiconductor compound or alloy with a sufficient combination of a first isoelectronic dopant comprising atoms that form isoelectronic electron traps in the host crystal lattice that behave as deep acceptors and a second isoelectronic dopant comprising atoms that form isoelectronic hole traps in the host crystal lattice that behave as deep donors to lower the effective bandgap of the semiconductor compound or alloy.

Sub B24

2. (Amended) A method of modifying a semiconductor compound or alloy comprising host atoms in a host crystal lattice to have a lower effective bandgap than the semiconductor compound or alloy has prior to modification, comprising:

A1 cont.

isoelectronically co-doping the semiconductor compound or alloy with a first isoelectronic dopant comprising atoms that form isoelectronic electron traps in the host crystal lattice that behave as deep acceptors and with a second isoelectronic dopant comprising atoms that form isoelectronic hole traps in the host crystal lattice that behave as deep donors, such that content of the first isoelectronic dopant in the semiconductor compound or alloy is more than 1 at.% and content of the second isoelectronic dopant in the semiconductor compound or alloy is more than 1 at.%.

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29. (Amended) A method of modifying a semiconductor compound or alloy comprising host crystal atoms in a host crystal to have a lower effective bandgap than the semiconductor compound or alloy has prior to modification, the method comprising:

isoelectronically co-doping the semiconductor compound or alloy with a sufficient combination of a first isoelectronic atomic species and a second isoelectronic atomic species to lower the effective bandgap of the semiconductor compound or alloy,

A2

wherein said first isoelectronic atomic species is sufficiently different in electronegativity, size, and pseudo potential difference from host crystal atoms that are substituted by the first isoelectronic atomic species to generate an isoelectronic trap whose impurity potential is sufficiently deep and of a very short range to behave as acceptors, and

wherein said second isoelectronic atomic species is sufficiently different in electronegativity, size, and pseudo potential difference from host crystal atoms that are substituted by the second isoelectronic atomic species to generate an isoelectronic trap whose impurity potential is sufficiently deep and of a very short range to behave as donors.

Sub B24

30. (Amended) A semiconductor material for use as an active cell in a semiconductor device, the material comprising:

a semiconductor compound or alloy comprising host atoms in a host crystal lattice with an effective bandgap that is modified by isoelectronic co-doping with a sufficient

combination of a first isoelectronic dopant comprising atoms that form isoelectronic traps in the host crystal lattice that behave as deep acceptors and a second isoelectronic dopant comprising atoms that form isoelectronic traps in the host crystal lattice that behave as deep donors to lower the effective bandgap of the semiconductor material.

77. (Amended) A method of fabricating thin film GaP semiconductor material on a Si crystal lattice, comprising:

A3

depositing a thin film of GaP at a temperature of at least about 700 °C on the Si crystal lattice to achieve two-dimensional growth of polar GaP on non-polar Si;

prior to cooling the thin film of GaP and the Si crystal lattice to room temperature, isoelectronically co-doping the thin film of GaP with a deep acceptor element and a deep donor element in a proportion that reduces compressive misfit strain of the GaP on the Si crystal lattice; and

cooling the thin film of isoelectronically co-coped thin film of GaP and Si crystal lattice to room temperature as the misfit compressive strain reduces to a residual misfit strain of the isoelectronically co-doped GaP on the Si crystal lattice at room temperature that is of lesser magnitude than the compressive misfit strain of the GaP on the Si crystal lattice would be without such isoelectronic co-doping.

A4

81. (Amended) The method of claim 77, including isoelectronically co-doping the GaP with sufficient deep acceptor element and deep donor element to change compressive lattice mismatch between the GaP and the Si to enough tensile lattice mismatch to offset additional compressive lattice mismatch strain that occurs while heating the Si crystal lattice and depositing GaP at a temperature of about 700 °C.

85. (Amended) A light-emitting diode, comprising:

A5

an active layer of Group III - V semiconductor compound or alloy that is modified to have a lower-effective bandgap by isoelectronically co-doping the Group III – V

semiconductor compound or alloy with sufficient concentrations of a deep acceptor element and a deep donor element to produce the lower effective bandgap, said active layer being sandwiched between: (i) a first barrier layer of the Group III - V semiconductor compound or alloy charged-doped to either n-type or p-type; and (ii) a second barrier layer of the Group III - V semiconductor alloy charged-doped to either n-type or p-type, whichever is opposite the charge-doped first barrier layer.

A5

A6

119. (Amended) A laser diode, comprising:

an active region comprising a set of Group III - V semiconductor compound or alloy MQW layers that are modified to have lower effective bandgaps by isoelectronically co-doping the MQW layers of Group III – V semiconductor compounds or alloys with sufficient concentrations of a deep acceptor element and a deep donor element to produce the lower effective bandgaps, said MQW layers being separated by barrier layers of Group III - V semiconductor compound or alloy, said active region being sandwiched between a bottom SCH layer of Group III - V semiconductor compound or alloy and a top SCH layer of Group III - V semiconductor compound or alloy;

a bottom cladding layer of group III - V semiconductor compound or alloy underlaying the bottom SCH layer; and

a top cladding layer of Group III - V semiconductor compound or alloy overlaying the top SCH layer.

A7

132. (Amended) A photodiode, comprising:

an active junction of Group III - V semiconductor compound or alloy, which is modified to have a lower effective bandgap by isoelectronically co-doping the Group III – V semiconductor compound or alloy with sufficient concentrations of a deep acceptor element and a deep donor element to produce the lower effective bandgap, and which is fabricated on a substrate of Group III - V semiconductor compound or alloy.

Please cancel claim 79 without prejudice to the substance recited therein.